IND 005 174 254

SUPPLEMENTAL CORRECTIVE MEASURES INVESTIGATION WORK PLAN

DUPONT EAST CHICAGO SITE

EAST CHICAGO, INDIANA

Date: August 2007

Project No.: 507754
18984147.07005

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 19
Wilmington, Delaware 19805

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

LU-9J

October 18, 2007

Mr. Alan Egler
DuPont Corporate Remediation Group
Barley Mill Plaza
Building 27
4417 Lancaster Pike
Wilmington, DE 19805

RE: Supplemental CMS Work Plan Submittal, 8/17/07

Dear Mr. Egler:

The United States Environmental Protection Agency Region 5 (USEPA) has received and reviewed DuPont East Chicago's Supplemental CMS Work Plan, and as we discussed, please consider this letter to be conditional approval to initiate the additional sampling activities in the plan.

Although issues still remain with respect to ecological risk as well as timing issues involving input from other federal and state agencies, this sampling and interim measures work is vitally important, and should be commenced without delay. After the results are obtained and shared with USEPA, and a remedies are considered and selected, the remaining issues such as ecological risk will be addressed at that time.

If you have any questions or comments please don't hesitate to convey them to me with a phone call to (312) 353-2720, or with an email to freeman.brian@epa.gov.

Sincerely,

Brian P. Freeman

Brian P. Freeman,
Corrective Action Project Manager

cc: Sathya Valvigi., DuPont
Chris Myer, IDEM
DuPont East Chicago Corrective Action File

URS

URS Diamond

August 17, 2007

Mr. Brian P. Freeman
U.S. EPA, Region V
Waste Pesticide and Toxics Division
Enforcement and Compliance Assurance Branch
77 West Jackson Boulevard, DRE-9J
Chicago, Illinois 60604-3590

Supplemental Corrective Measures Study Work Plan

Dear Mr. Freeman:

Pursuant to RCRA Corrective Action Order IND 005 174 254, on behalf of DuPont, please find enclosed three copies of a Supplemental Corrective Measures Study Work Plan. This Supplemental CMS Work Plan has been prepared in response to discussions with the EPA to address data gaps and to perform delineation activities necessary to assess potential remedial measures.

DuPont will revise and finalize the Work Plan based on your review and comment. Upon receiving final approval, we will initiate implementation.

If you have any questions, please feel free to call Alan Egler at (302) 892-1296.

Sincerely,

Philip Chen for Alan Egler

Alan Egler
Project Manager
URSD

cc: Chris Meyers, IDEM
Bernie Reilly, DuPont Legal (cover ltr only)
Sathya Yalvigi, DuPont
File Copy

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This Supplemental CMS Workplan has been prepared in response to discussions with the EPA to address data gaps that currently preclude the preparation of the Statement of Basis for the site and to perform delineation activities necessary to implement an interim remedial measure for soils. The purpose of this document is to outline the technical approach and objectives of the Supplemental Corrective Measures Study (CMS) investigation as well as the field activities and procedures that will be used during the investigation. The objective of this supplemental investigation is to collect additional data that will assist in the remedial design to address contaminated soil and groundwater on portions of the DuPont East Chicago site located in East Chicago, Indiana. The activities proposed to meet this objective include the following:

- Delineate constituent concentrations in surface soils within areas proposed for a human health interim remedial measure (IRM);
- Assess constituent concentrations in surface soils to support a refined ecological risk assessment;
- Assess potential groundwater source areas for impact to groundwater; and
- Collect groundwater data for use in the design of groundwater remedies, including a potential Pool B (southern).

1.1 Delineation of Surface Soil Conditions – Human Health

The Human Health Baseline Risk Assessment (HH BLRA) approved by EPA in December 2004 evaluated the potential exposure of human receptors to constituents detected in soil and groundwater at solid waste management units (SWMUs) and areas of concern (AOCs) identified at the site. Since the HH BLRA was performed primarily using conservative default exposure assumptions, the results provided a worst-case estimate of risk. To provide a more realistic evaluation in light of the anticipated plans for site reuse, a site-specific risk evaluation was performed as part of the CMS submitted to EPA in October 2006 to guide the selection of potential remedies for the site (DuPont 2006a). As detailed in the site-specific evaluation, mitigating factors are in place that minimize the potential for direct contact and control worker exposure for potentially complete soil exposure pathways at the site. However, there are some selected locations where constituent concentrations in surface soils significantly exceeded their respective screening levels. In order to address potential risks from these constituent concentrations, the CMS considered short duration exposure to surface soils under a trespasser scenario to derive site specific remedial levels for constituents of concern (COCs) identified in the HH BLRA (such as arsenic and lead). Areas where these acute remedial levels were exceeded will be referred to as "elevated concentrations of COCs" for the remainder of this Work Plan.

Remedial levels for arsenic and lead have been exceeded at nine SWMUs and four AOCs. Areas with elevated concentrations of COCs are, in general, individual soil boring locations or several contiguous soil boring locations. DuPont has agreed to expedite remediation through an Interim Remedial Measure (IRM) of these areas with arsenic or lead concentrations are elevated. This Work Plan outlines activities associated with delineation of the lateral extent of these areas in support of the planned IRM. Soil delineation and remediation will be focused on only the surface soils because institutional controls will be employed to address potential exposure to constituents in the subsurface.

1.2 Delineation of Surface Soil Conditions - Ecological

A baseline ecological risk assessment (BERA) performed as a component of the Phase II RCRA Facility Investigation (RFI) indicated that there were potentially elevated risks to ecological receptors posed by constituents in surface soils (DuPont, 2006b). As detailed in the BERA, the assessment utilized the maximum concentration within eleven different "exposure areas" to estimate ecological risk. This approach included concentrations from the elevated concentrations of COC areas, identified by the HH BLRA as requiring remedial measures, to estimate the ecological risk for the majority of the industrial portion of the site. Use of the elevated concentration data as exposure point concentrations (EPCs) overestimates the risk to ecological receptors on this site. In addition, the proposed United States Army Corps of Engineers (USACE) Confined Disposal Facility (CDF) has defined the future land use for 75 acres as exclusive of ecological use, thereby negating the need for evaluating this section of the site.

To reduce the amount of uncertainty associated with the EPC, and to incorporate the more definitive future use of the site, a refined ecological risk assessment will be performed on a unit by unit basis. The ecological risk assessment will be conducted for SWMUs or AOCs outside of the CDF area, to focus future remedial decisions on those units that provide the highest quality habitat or ensure the protection of the high quality habitat of the Natural Area. It is recognized that upland areas to the west of the planned CDF will be used, in the future, for industrial purposes and therefore a detailed assessment of ecological risk for the western portion of the site will not be performed. The area between the planned CDF and Natural Area boundary, a 200 foot "Natural Area Buffer Zone," will be investigated during this supplemental CMS investigation to determine whether this area is providing a buffer of adequate quality between the upland areas and the Natural Area to protect the Natural Area from site-related constituent migration. This Work Plan outlines the soil sampling activities for units that are within the buffer zone.

1.3 Assessment of Potential Pool B Groundwater Source Areas

The groundwater within the southern portion of the site is referred to as "Pool B groundwater." Based on peizometric maps, groundwater flows south toward the Grand Calumet River. DuPont has elected to perform a Pool B groundwater study to better delineate groundwater constituent concentrations associated with potential Pool B groundwater source areas.

The potential Pool B groundwater source areas were initially identified in the Phase II RFI (2005a). The Phase II RFI identified SWMUs and AOCs that may be acting as a source of constituents to groundwater at concentrations of interest. Additional data collected in support of the 2006 BERA indicate that an additional three SWMUs/AOCs have elevated concentrations of constituents in soils that could provide a source to ground water. Potential ground water source areas will be assessed to determine the potential for ongoing contributions to ground water.

The groundwater data collected in the area of these SWMUs and AOCs will be used to:

- Determine if the units are likely to impact groundwater, and
- Evaluate potential remedial options that could address potential Pool B groundwater constituent contributions to the Grand Calumet River.

1.4 Report Organization

The remainder of this Work Plan is organized into the following sections.

- Section 2 describes the site location and setting, geology, hydrogeology, surface water and topography, and current and proposed IRM.
- Section 3 describes the scope of work.
- Sections 4 through 6 describe the equipment decontamination, quality assurance/quality control (QA/QC), Health and Safety Plan (HASP), and Waste Management Plan.
- Section 7 contains the references cited in this Work Plan.

2.0 BACKGROUND

The following sections provide a brief summary of the background of the DuPont East Chicago site. Information contained in these sections is summarized from the Current Conditions Report (CCR) (CH2MHill, 1997), the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report (DuPont, 2002), and the Environmental Indicator (EI) Determination Report Groundwater Contamination Under Control (CA750) (DuPont, 2005b).

2.1 Site Location and Setting

The DuPont East Chicago site is located at 5215 Kennedy Avenue, East Chicago, in Lake County, Indiana (see Figures 2.1 and 2.2 for Site Location Map and General Site Map). The site is bounded on the north by the Riley Park residential area and various commercial properties, on the south by the East Branch of the Grand Calumet River, on the east by commercial properties (including the City of East Chicago Solid Waste Transfer Station) and the DuPont Natural Area that is maintained by the Nature Conservancy, and on the west by Kennedy Avenue and the former USS Lead Refinery.

2.2 Manufacturing and Production History

2.2.1 Manufacturing History

In 1892, the Grasselli Corporation constructed an inorganic chemical manufacturing facility at this site; facility operation was initiated in 1893. DuPont operated the facility for Grasselli from 1927 through 1936. Grasselli formally deeded the entire property to DuPont on October 31, 1936, and the facility has since been owned and operated by DuPont. Operations peaked around 1945 and began to decline after World War II. Between 1950 and 1970, the facility employed 700 workers. In 1990, it employed 52 workers to manufacture two products – sodium silicate and colloidal silica. Manufacturing operations, including support activities, now cover 28 acres in the southwest corner of the site. The work force consisted of about 40 employees in early 2000 when the business was sold to W.R. Grace Company; ownership of the property was retained by DuPont.

2.2.2 Production History

Over its 105-year lifetime, the DuPont East Chicago facility produced more than 100 products, primarily inorganic acids and chemicals; various chloride, ammonia, and zinc products; and inorganic agricultural chemicals. Organic chemical manufacturing began in 1948, after more than 50 years of plant operation, and ended in 1986. Organic chemical manufacturing consisted primarily of trichlorofluoromethane (TCFM) or Freon® products. Freon production by DuPont was initiated at the federal government's request. In addition, several organic herbicides and insecticides were also manufactured.

Currently the site, operated by WR Grace, manufactures sodium silicates and colloidal silica.

2.3 Geology

2.3.1 Regional Geology

The DuPont East Chicago site lies within the Calumet Lacustrine Plain. The surface geologic deposits in this area are beach ridge and dune complex deposits formed during and after the last glacial age when Lake Michigan water levels were significantly higher than present levels. Beach ridges and dunes are characterized by fine to medium sands that are intermittently coarse or pebbly and rich in natural organic matter. This unit, known as the Calumet Sand, is up to 65 feet thick (Watson, et al., 1989).

The Calumet Sand was deposited on an irregular surface eroded into glacial till and/or lacustrine clay. The till consists of a stiff, gray, silty clay matrix with pebbles and rock fragments. There are discontinuous sand and gravel layers within the till. The Calumet sand/till contact slopes toward Lake Michigan at approximately 0.0013 feet/feet. Together, the thickness of the till and Calumet Sand is approximately 100 to 160 feet. The till lies directly upon the bedrock near the plant site.

Beneath the Calumet Sand and the till lies a sequence of about 4,400 feet of sedimentary rocks (Rosenshein and Hunn, 1968). They are, from youngest to oldest, Middle Silurian Dolomite, Upper Ordovician shale, Middle Ordovician sandstone, Lower Ordovician and Upper Cambrian dolomite and sandstone, and Upper Cambrian sandstone, shale, and dolomite.

Regional dune and beach deposits in the area surrounding the site are characterized by low-lying dune and swale sequences. Industrial and residential development of the dune and swale sequence required that fill be used to raise the surface elevation above the groundwater/surface-water interface. Historical fill materials derived from heavy industrial sources were used to raise the surface elevation both at the site and in neighboring Riley Park (Kay, et al. 1997).

2.3.2 Site Geology

The DuPont East Chicago site consists of fill and uniform unconsolidated beach sand (the Calumet Sand) overlying clay till. Fill material on the East Chicago site is characterized as natural material and industrial waste (Kay, et al. 1997). Areas where manufacturing activities previously occurred are characterized by fill and debris overlying the natural dune and swale sequence. Due to the undulating nature of the dunes and swales, fill depth is reported as ranging from 12 feet to none at all. In most locations in the developed portion of the site, fill depths range from 2 to 6 feet (DuPont, 2002). Natural peat, silt, and sand have been reported below the fill. The base of the sand (the sand/till contact) is encountered at an approximate depth of 27 to 42 feet below ground surface (bgs). During the Phase II RFI, cross-sections were developed for the site. Soil borings installed at the site have established the uniformity of the sand in the Calumet Sand deposits at the site.

Site bedrock stratigraphy is documented in a geologic log for a deep test well that was installed (and later abandoned) in 1915 by the Grasselli Corporation. Site-specific stratigraphy is consistent with regionally reported stratigraphy, with the Calumet Sand present to a depth of 40 feet bgs (directly underlain by a clay till) and Silurian dolomite bedrock encountered at 150 feet bgs.

2.4 Hydrogeology

2.4.1 Regional Hydrogeology

Where saturated, the Calumet Sand is known as the Calumet Aquifer. Regionally, the saturated thickness of the Calumet Aquifer ranges from 0 to 70 feet, the porosity from 0.3 to 0.4, the transmissivity from 670 to 4,000 square feet per day (ft^2/day), and the hydraulic conductivity from 1 to 180 feet/day (Rosenshein, 1961; Rosenshein and Hunn, 1968; Watson, et al., 1989; Fenelon and Watson, 1993; Greeman, 1995; Kay, et al., 1996). The primary inflow to the Calumet Aquifer is recharged by precipitation infiltration. Annual recharge from precipitation has been estimated at 5 to 13 inches/year (Watson, et al., 1989; Fenelon and Watson, 1993; Greeman, 1995).

The hydraulic conductivity of the clay till underlying the Calumet Aquifer is estimated to range from 0.0004 to 0.06 feet/day (Rosenshein, 1961; Fenelon and Watson, 1993; Kay et al., 1996). Under the vertical gradients observed in the region, the till acts as a confining unit separating the Calumet Aquifer above from the bedrock aquifer below.

The United States Geological Survey (USGS) measured water levels at a network of 96 groundwater and surface-water sites in Northern Lake County in northwest Indiana (Greeman, 1995). Five of the wells installed and monitored by the USGS as part of the regional studies are located on the East Chicago site. Potentiometric surface maps have been developed using USGS potentiometric data. The data indicate that groundwater flow discharges to area surface-water bodies (Lake Michigan, Grand Calumet System) or is captured by area sewers, drains, or other dewatering systems. Regional potentiometric surface-water maps are contained in the Environmental Indicator Determination Report (CA750) (DuPont, 2005b).

2.4.2 Site Hydrogeology

Groundwater is encountered at the site approximately 0 to 10 feet bgs in the fill or Calumet Sand underlying the facility. The aquifer material consists of sand and, in some instances, fill or peat overlying the sand. The base of the sand is about 35 to 40 feet bgs. The sand lies upon a relatively flat impermeable clay till.

Groundwater flows away from an east-west trending groundwater divide that runs through the developed part of the site (see Figure 2-3), which is at least partially due to elevated topography. The groundwater system underlying the site has been subdivided into pools that are identified as Pool A (located north of the groundwater divide) and Pool B (located south of the groundwater divide – see Figure 2-3). On the northern side of the divide (Pool A), groundwater flows to the north toward Riley Park, a salvage yard, and trucking operations. On the southern side of the divide (Pool B), groundwater flows south and discharges to the Grand Calumet River.

2.5 Surface Water and Topography

2.5.1 Regional Surface Water

The Grand Calumet System (which comprises the East Branch, West Branch, and Indiana Harbor Canal) is the predominant surface-water feature within the region. In the early 1800s, the smaller natural river (referred to as the Grand Calumet River) flowed to the east, discharging to Lake Michigan in Gary. In the early 1900s, the Indiana Harbor Canal was dug between Lake Michigan and the river to provide a shipping canal for local industry (see Figure 2-1 for location of canal). These modifications reversed the flow in the East Branch so that water in the original channel now flows to the west. Construction of the Indiana Harbor Canal and connection (in the West Branch) to the Illinois River Basin Sag System resulted in capture of water that would have drained east to Lake Michigan. Streamflow in the eastern part (the East Branch) of the Grand Calumet System was significantly reduced. The reduced flow, combined with the sand dune migrations, resulted in the closure of the river's original outlet at Lake Michigan (about 10 miles east of the East Chicago site).

Shortly after the East Branch outlet was closed, this waterway's characteristics were dramatically altered. The channel became the primary conveyance system for effluent discharges from the industries and municipalities in the region. The maximum river flow in the East Branch occurred when the effluent discharges from industries along the waterway were at the highest levels (from the mid-1940s through the mid-1970s).

Today, flow from the East Branch joins flow from the West Branch just west of the East Chicago site, at the southern end of the Indiana Harbor Canal. The canal conveys the combined flow north-northeast to Lake Michigan. The rate of flow to the lake is controlled primarily by industrial discharges and the relative elevation of surface water in the channel and lake (Fenelon and Watson, 1993).

2.5.2 Site Topography

Topography in the developed part of site has been altered by filling and regrading. Soil and other fill materials were used to create a secure site foundation within the primary manufacturing area. Site relief varies from 584.5 to 590.5 feet above mean sea level, sloping gently (0.003 to 0.006 feet/feet) toward the south-southwest. There is a regional high of 600 feet (±5 feet) in a ridge at the center of the northern half of the site. The distinctive dune and swale topography in the eastern undeveloped part of the site reflects original beach ridges and swales created by former Lake Michigan shoreline processes.

3.0 SUPPLEMENTAL CMS SCOPE OF WORK

This section presents the scope of work and general technical approach associated with each of the activities proposed for this supplemental CMS investigation. Field sampling methodologies are presented in Appendices A and B.

3.1 Delineate Surface Soil Conditions

3.1.1 Scope of Work to Address Human Health

Nine SWMUs and four AOCs were identified in the CMS with elevated concentrations of arsenic and lead within portions of: SWMUs 1A, 1I, 1J, 3, 4, 7, 10B, 10D and 14 and AOCs 2E, 6, 12 and 13. The location of the samples exceeding remedial levels can be found in Figure 3-1.

These units will be investigated to further define the horizontal extent of COCs in surface soil. During previous investigations, surface soil samples were collected from the upper two feet. As a result, two sample intervals within the surficial soil (0 to 0.5 ft bgs and 0.5 ft to 2 ft bgs) will be collected from each boring location during the supplemental CMS investigation. Sampling will occur at each unit on a grid ranging in size 300 ft by 250 ft for a large SWMU to 50 ft by 50 ft for smaller SWMUs. Figure 3-2 presents proposed locations which will be analyzed for the inorganic COCs presented in Table 3.1.

Soil analytical data collected from this delineation effort, in combination with the existing data set, will be used to support both the IRM and final remedial design to mitigate potentially complete exposure pathways for humans. For instance, surface soil data (from 0 to 0.5 ft bgs) will be used to determine the extent of the IRM. Deeper surface soil data (from 0.5 to 2 ft bgs) will be used to determine the distribution of soils that may require remedial action during the final remedy selection. Additional step out sampling will be employed if soils at the outer boundary of the proposed grid have estimated concentrations greater than remedial levels based on field screening of soils using an XRF. All samples, including those screened by XRF will be submitted to the laboratory for inorganics analysis.

Data collected from the delineation effort will also be used to quantify post-remedy residual risks for areas not addressed by the IRM. The Supplemental CMS will contain an evaluation of the potential exposure of human receptors to constituents remaining after IRM implementation.

3.1.2 Scope of Work to Address Ecological Exposure

Site related constituents are most likely to migrate downgradient, to the high quality habitat in the Natural Area, from SWMUs and AOCs that are located within a 200-foot wide Natural Area Buffer Zone. As a result, additional surface soil samples will be collected to provide greater spatial resolution of constituent distribution within SWMUs and AOCs located in the Natural Area Buffer Zone. The units of interest include

SWMUs 1B, 1C, 2C, 2D, 3, 10A, 10B, 10C, 10D, 14, and AOC 12. Data collected from this delineation effort will primarily be used to estimate potential risks to ecological receptors within the Natural Area Buffer Zone. However, data collected from SWMUs 10B, 10D and 14 and AOC 12 will also be used to estimate potential risks for human receptors as detailed in Section 3.1.1.

Similar to the scope of work for human health, sampling at these units will occur on a grid that has been customized for the size of the SWMU or AOC. The anticipated sample location points for these units can be found in Figure 3-2. Samples will be collected from the surficial soils at each sampling point from three sample intervals (0 to 0.5 ft bgs, 0.5 ft to 1 ft bgs and 1 ft to 2 ft bgs) and analyzed for the constituents listed in Table 3.1.

In addition to focused sampling within the Natural Area Buffer Zone, sampling will be undertaken in an attempt to establish anthropogenic background concentrations of the fill material utilized to construct the industrial portion of the site. This material is noted as fill that may contain inorganic constituent concentrations that are higher than the natural sand material found in the undisturbed portions of the site (Kay, et al. 1997). Anthropogenic background samples will be collected from within the fill material in areas where historical records or aerials indicate no previous active manufacturing. Recognizing that the fill is a regional condition that indigenous species appear to tolerate, remedial decisions for ecological receptors will be focused on areas that exceed acceptable ecological risk levels and these anthropogenic background concentrations.

Ten anthropogenic background soil samples will be collected from the fill material in areas where historical records or aerials indicate no previous active manufacturing. Due to the expected heterogeneity of the fill, samples will be collected from the following intervals: 1 ft to 2 ft bgs, 2 ft to 3 ft bgs, and 3 ft to 4 ft bgs where fill is observed. The anticipated sample location points for the anthropogenic background soil samples can be found in Figure 3-3. Similar to the soil samples collected during this phase of the investigation these background soil samples will be analyzed for the inorganic constituents presented in Table 3.1.

3.2 Assessment of Potential Groundwater Source Areas

The objective of the potential groundwater source area assessment is to better understand the distribution of the groundwater constituents in the area of Pool B SWMUs and AOCs that might be acting as source areas. The Phase II RFI (2005a) identified eight SWMUs and AOCs as having the potential to act as the source area of constituents to groundwater at concentrations of concern. To determine the concentration of the constituents of interest in groundwater upgradient and downgradient of these SWMUs/AOCs, 23 cone penetrometer (CPT) groundwater borings will be installed (See Appendix A for groundwater sampling methodology). The CPT groundwater sampling will be performed after completion of the CPT geophysical lithologic activities (See Section 3.3 for additional details). CPT groundwater samples will be collected from approximately 10, 22, and 35 feet bgs, however, these depths may be adjusted based on the hydrogeologic findings associated with the CPT geophysical lithologic activities. The CPT groundwater samples will be analyzed for the constituents of interest identified in Table 3.2. Figure 3-3 details the proposed CPT locations.

3.3 Data for Selection of a Groundwater Remedy

In addition to the CPT field activities associated with potential groundwater source areas, CPT activities will also be performed adjacent to the Grand Calumet River (See Figure 3-3). The groundwater data collected from both activities will be used to better understand the impact that site-related constituents may have on the Grand Calumet River. The assessment of this data will facilitate the selection of remedial alternatives. The data to be collected will include the following:

- Subsurface lithologic data will be collected using CPT geophysical methods. The lithologic data will be used to better understand the subsurface conditions and to determine the depth to the base of the aquifer.
- CPT hydraulic conductivity data will be collected to assist in understanding groundwater flow characteristics.
- Piezometers will be installed to refine groundwater flow direction in the area upgradient of the Grand Calumet River.
- Groundwater and soil samples will be collected for laboratory analysis. The laboratory analytical results will be used to identify the distribution and concentration of the constituents of interest.

3.3.1 CPT Lithologic Information and Hydraulic Conductivity Measurements

CPT geophysical borings will be advanced adjacent to the Grand Calumet River and around units (SWMUs/AOCs) identified as containing constituents that have the potential to impact groundwater (discussed further in Section 3.2). The data collected will be used to evaluate subsurface lithologic conditions. At each of the 55 CPT boring locations (see Figure 3-3), a CPT equipped with a geophysical probe will be used to determine the subsurface lithology and depth to groundwater. The CPT geophysical probe will be advanced down to the base of the aquifer. Data to be collected will include the following: friction ratio, cone-end bearing resistance, soil electrical conductivity, and generated pore pressure.

The geophysical data will be collected in real time at each boring location and will be stored electronically for further review. Lithologic interpretation of the geophysical data will be performed by a qualified contractor associated with the contracted CPT company.

In addition to the geophysical data, at 10 of the 32 CPT lithologic borings adjacent to the Grand Calumet River, CPT hydraulic conductivity testing will be performed to determine the hydraulic conductivity values within aquifer near the river.

3.3.2 CPT Piezometers Installation

Piezometers will be installed at select locations adjacent to the Grand Calumet River to collect groundwater gradient information. This information will be used to refine groundwater flow gradients adjacent to the river. A total of nine piezometers will be installed at the locations identified in Figure 3-3.

Using the CPT rig, the piezometers will be installed to a depth of approximately 10 feet below the water table. The top-of-casing for each piezometer will be surveyed in place for XY and Z coordinates by a surveyor that meets applicable state requirements.

The collection of depth to water readings will be initiated 24 hours after installation of the last piezometer. This 24 hour period will allow for the groundwater in the area of the piezometers to reach equilibrium. The groundwater elevation data will be used to assist in determining the groundwater flow gradient in the area.

3.3.3 CPT Groundwater Sampling Adjacent to River

Groundwater samples will be collected in the area adjacent to the Grand Calumet River to identify the distribution and concentration of the potential constituents of interest that could be reaching the river.

At each of the 32 CPT locations adjacent to the river, a CPT groundwater sample boring will be advanced. CPT groundwater sampling will be performed after completion of the CPT geophysical lithologic activities; CPT groundwater samples will be collected from approximately 10, 22, and 35 feet bgs. These depths may be adjusted based on the lithologic findings associated with the CPT geophysical activities. Figure 3-3 details the proposed CPT locations.

The CPT groundwater samples will be analyzed for inorganic constituents of concern and for constituents associated with future groundwater chemistry modeling activities (Table 3.2). Appendix A details the sampling methodology for groundwater.

3.3.4 Soil Samples Adjacent to the River

Soil samples associated with the Grand Calumet River CPT borings will be collected at two foot intervals from within the anthropogenic fill material for the laboratory analysis listed in Table 3.1. These soil analytical results will be used to characterize the soils for waste management purposes and to ensure application of appropriate levels of protective personal equipment, if needed, for remediation workers if an invasive remedy is selected.

Using clean equipment, soil samples will be collected from four CPT locations; CPT sampling locations are identified in Figure 3-3. The soil samples will be collected from ground surface down to the total depth of the anthropogenic fill material. Soil samples will be collected using either one, or a combination of the following methods:

- Clean hand auger
- Clean sampling device driven by either a Geoprobe, drill rig, or CPT rig

Appendix B presents the sampling methodology for soil.

4.0 EQUIPMENT DECONTAMINATION

To limit the concern of cross contamination from other sites, the sampling rigs will arrive at the DuPont East Chicago site free of dirt and debris from the previous job. If the rig arriving on-site is determined to be dirty, the contractor, at the contractor's cost, will need to construct a decontamination pad, pressure wash the rig clean, collect, and transport the wash water for disposal.

Once the rig has been inspected and determined to be free of dirt/debris, two methods of equipment cleaning will be applied during this project. Larger size equipment, such as the rods and related tools, will undergo a high-pressure steam cleaning (inside and outside of rods) prior to the initiation of this investigation, between the collection of each sample, and at the completion of this investigation. If a CPT rig is used it is expected that the rig will be equipped to pressure wash the outside of the rods as they are extracted from the ground. Pressure washing the insides of the rods can be performed using a clean 55-gallon drum (to be supplied by the contractor); an acceptable alternative method can be used once it has been approved by the on-site DuPont representative.

Smaller equipment will be cleaned using a chemical wash that will consist of the following steps:

1. Scrub wash with non-phosphate detergent.

2. Rinse with deionized/distilled water.

5.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality assurance/quality control (QA/QC) procedures will be performed to ensure that the data collected is both valid and representative of the site conditions. Additional details regarding the QA/QC program for this supplemental CMS investigation will be provided in a site-specific Quality Assurance Project Plan to be developed for this project.

5.1 Field Quality Control

Field quality control samples will include field duplicates, matrix spike/matrix spike duplicates, equipment rinsate blanks, and trip blanks. The following quality control samples will be collected in the field and analyzed by the analytical laboratories with the natural samples:

- Field Duplicates: Field duplicate samples will be collected and analyzed to assess the variability of chemical concentrations at a location. Field duplicates provide a measure of the total analytical bias (field and laboratory variance), including bias resulting from the heterogeneity of the replicate sample set itself. Field duplicates will be collected at a minimum frequency of 1 per 10 samples or once per sampling event, whichever is more frequent.
- Matrix Spike/Matrix Spike Duplicates (MS/MSD): These samples will be collected at a minimum frequency of 1 per 20 samples. Matrix spikes provide information about the effect of the sample matrix on digestion or extraction and measurement methodology.
- Equipment Blanks: Equipment blanks (also called rinsate blanks) will be collected to help identify possible contamination from the sampling environment or from the sampling equipment (e.g., grab, bowls, spoons, pump or tubing). For groundwater samples, the equipment blank will be collected by passing deionized water through clean sampling equipment. An equipment blank will be collected from the field at a frequency of 1 per 20 field samples or once per sampling event, whichever is more frequent.

5.2 Laboratory Quality Control

All sample preparation and analytical procedures are documented in writing as standard operating procedures (SOPs), and each SOP includes a QA or QC section which addresses the minimum QC requirements for the procedure. These SOPs are implemented by DuPont's contract laboratories, Lancaster Laboratories, Inc. and STL Laboratories. The following bullets outline the minimum QC procedures that will be undertaken to ensure the validity and reproducibility of these data:

- A minimum of one method/preparation blank will be analyzed with each prep batch of up to 20 field samples.

- A minimum of 1 MS/MSD pair or MS/laboratory duplicate will be analyzed for every 20 field samples to determine accuracy, precision, and the presence of matrix effects.
- A minimum of 1 laboratory control standard (LCS) for every batch of less than or equal to 20 field samples of a similar matrix to determine recovery.
- Multilevel initial calibration of instruments to establish calibration curves plus the analysis of calibration verification standards (metals and general chemistry), and recalibration if these do not meet criteria.
- Calibration blanks for metals prior to and between analyses of samples.
- ICP Interference Check Standards after initial calibration and after samples are analyzed.
- An ICP Serial Dilution Analysis for every 20 samples of a similar matrix.
- Control limits statistically determined by the laboratories.

5.3 Data Review

The laboratory data deliverables will be submitted to the DuPont Corporate Remediation Group's (CRG) Analytical Data Quality Management (ADQM) Group in both hardcopy and electronic data formats. Upon receipt of the deliverables package, the ADQM Group will perform the following data review functions:

- The electronic data will be loaded into the CRG Envista database to facilitate the semi-automated review process and accessibility of the project data.
- A completeness check will be performed of project data to ensure all requested samples were analyzed and the test results were reported.
- A quality control (QC) review will be performed on laboratory data to evaluate batch integrity per SW-846 guidance, and to ensure that QC acceptance criteria exceptions (versus laboratory and/or project limits) are properly documented via data qualifiers and/or narrative comments.
- Submit 100% of project laboratory data for evaluation via DuPont's semi-automated in-house Data Review Process (DDR), which applies data usability qualifiers based on the specific project and/or laboratory QC limits, and generates a narrative evaluation of data usability.

All of the data to be generated for the supplemental CMS investigation will be reviewed via as part of the DuPont data review functions, which equate to an equivalent of a summary-level validation. Because the DuPont data review is equivalent to a summary level validation on 100% of the data, an additional third party summary validation of a subset is not deemed necessary.

5.4 Data Evaluation and Reporting

Data generated by this investigation will be utilized to assist in implementing IRM activities for surface soil and to assess the need for, and possible selection of, remedial alternatives for ground water and surface soils that are determined to be outside of applicable exceedance areas. Data collected in support of remedial decision making will be presented in a Supplemental CMS report. Data collected to delineate areas targeted for IRMs will be utilized to design the IRM. A summary of this action will be included in the Supplemental CMS.

6.0 HEALTH AND SAFETY/WASTE MANAGEMENT

6.1 Health and Safety Plan

A Health and Safety Plan (HASP) and Waste Management Plan (WMP) will be appended by DuPont for the identified field activities. Addenda to these plans have not been included in this Work Plan but will be delivered to appropriate personnel under a separate cover.

It is anticipated that Modified Level D personal protective equipment (PPE) will be used to perform activities on-site as follows:

- Hard hat
- Safety glasses with affixed sideshields
- Poly-coated Tyvek® coveralls taped at wrists and ankles
- Steel toe boots with chemical resistant pullover boots or chemical resistant steel toe boots
- Leather work gloves for clean tasks
- Nitrile outer gloves/inner surgical gloves
- Hearing protection (as needed)
- Full faceshield over safety glasses (during decontamination activities)

6.2 Waste Management Plan

The waste material associated with this investigation is anticipated to consist of the following:

- Residual soil associated with the soil sampling activities
- Groundwater associated with the groundwater sampling activities
- Decontamination water associated with decontamination of the sampling equipment and the rig
- PPE (disposal coveralls, gloves, booties) associated with the sampling activities

It is anticipated that all waste will be disposed of as follows:

- All waste streams generated during CPT activities (e.g., chemical decon fluids, steam clean fluids, any potential purged groundwater) shall be contained by the Contractor in new, contractor-supplied, Department of Transportation (DOT)-approved, 55-gallon drums to await disposal by DuPont. Once filled, the contractor will transport the containers to the site's storage area for proper disposal by DuPont.
- All soil will be returned to the shallow boring from which it came.

- Ground water purged prior to sampling will be returned to the ground for infiltration; however, purged ground water associated with select wells with elevated concentrations of COCs will be containerized for proper disposal consistent with previous ground water sampling efforts.
- All PPE will be contained in plastic bags for appropriate disposal.

7.0 REFERENCES

CH2MHILL, Inc. 1997. Current Conditions Report for the DuPont East Chicago Facility. October 1997.

DuPont. 2006a. Corrective Measures Study, DuPont East Chicago, East Chicago Indiana. October 2006.

DuPont. 2006b. *Baseline Ecological Risk Assessment, East Chicago Indiana*. April 2006.

DuPont. 2005a. Final Phase II RFI Report, DuPont East Chicago Facility, East Chicago Indiana. January 2005.

DuPont. 2005b. Environmental *Indicator Determination Report, Migration of Contaminated Groundwater under Control (CA750), DuPont East Chicago Facility, East Chicago Indiana*. February 2005.

DuPont. 2002. Final Phase I RFI Report, DuPont East Chicago Facility, East Chicago Indiana. October 2002.

Fenelon, J.F., L.R. Watson. 1993. Geohydrology and Water Quality of the Calumet Aquifer, in the Vicinity of the Grand Calumet River/Indiana Harbor Canal, Northwestern Indiana. USGS Water-Resources Investigations Report 92-4115

Greeman, T.K. 1995. Water Levels in the Calumet Aquifer and their Relation to Surface-Water Levels in Northern Lake County, Indiana 1985 – 92. USGS Water Resources Investigation Report 94-4110.

Kay, R.T., T.K. Greenman, R.F. Duwelius, R.B. King, J.E. Nazimek. 1997. Characterization of Fill Deposits in the Calumet Region of Northwestern Indiana and Northeastern Illinois. USGS Water Resources Investigation Report 96-4126.

Kay, R.T., R.F. Duwelius, T.A. Brown, F.A. Micke, C.A. Witt-Smith. 1996. Geohydrology, Water Levels and Directions of Flow, and Occurrence of Light-Nonaqueous-Phase Liquids on Groundwater in Northwestern Indiana and the Lake Calumet Area of Northeastern Illinois. U.S. Geological Survey. Water Resources Investigation Report 95-4253.

Rosenshein, J.S. 1961. *Ground-Water Resources of Northwestern Indiana, Preliminary Report: Lake County*. USGS Bulletin No. 10.

Rosenshein, J.S.; J.D. Hunn. 1968. *Geohydrology and Ground-Water Potential of Lake County Indiana*. USGS Bulletin No. 31.

Watson, L.R., R.J. Shedlock, K.J. Banaszak, L.D. Arihood, P.K. Doss. 1989. Preliminary Analysis of the Shallow Ground-Water System in the Vicinity of the Grand Calumet River/Indiana Harbor Canal, Northwestern Indiana. USGS Open-File Report 88-492.

Table 3.1
Analytical Parameters for Surface Soil Sampling
DuPont East Chicago Site
East Chicago, Indiana

Location	**Number of Soil Boring Locations**	**Sample Interval**				
		0-0.5 ft	**0.5-1.0 ft**	**1.0-2.0 ft**	**0.5-2 ft**	**Other**
SWMU IA and 1I	27	x			x	
SWMU 1B	9	x	x	x		
SWMU 1C	13	x	x	x		
SWMU IJ	8	x			x	
SWMU 2C	7	x	x	x		
SWMU 2D	7	x	x	x		
SWMU 3	12	x	x	x		
SWMU 4	10	x			x	
SWMU 7	23	x			x	
SWMU 10A	9	x	x	x		
SWMU 10B	10	x	x	x		
SWMU 10C	4	x	x	x		
SWMU 10D	7	x	x	x		
SWMU 14	13	x	x	x		
AOC 2E	4	x			x	
AOC 6	22	x			x	
AOC 12	14	x	x	x		
AOC 13	15	x			x	
BKG	4					1-2', 2-3',3- 4'
CPT Borings	4					0-2', 2-4', 4'-base of fill or 4-6', 6'-base of fill

Analyte List

SW 846 Method 6010	Al, As, B, Ba, Cd, Cr, Co, Cu, Fe, Mn, Ni, Pb, Tl, Sb, Se, V, Zn
SW 846 Method 7471	Hg
SW 846 Method 9012	CN
SM 20 2540B	% Moisture
SW846 Method 9060A	TOC

Note:
TOC will be analyzed on a minimum of four samples per SWMU or AOC within the Natural Area Buffer Zone. Each sample interval will be analyzed for TOC if variability in the surface soil matrix is noted in the field and in the background sample locations.

Table 3.2
Analytical Parameters for Ground Water Sampling
DuPont East Chicago Site
East Chicago, Indiana

Well/CPT Boring	# Samples	Sample Interval	Conductivity Testing	Field Parameters	Dissolved Analytes	Total Analytes
CPT Borings						
Source Area Borings	23	10', 22', 35'		X	A	A
Grand Calumet River	32	10', 22', 35'	10 locations	X	A, B, D	A, B, C

Group:	Analyte List- Total and Dissolved Fractions	
A	SW 846 Method 6010B	Al, As, B, Ba, Cd, Cr, Co, Cu, Fe, Mn, Ni, Pb, Tl, Sb, Se, V, Zn
A	SW 846 Method 9012A	CN
B	SW 846 Method 6010B	Ca, K, Mg, Na, Si

	Analyte List- Total Fraction Only	
C	EPA 300.0	Cl, Sulfate
C	EPA 365.1	P as PO_4
C	SM 20 4500-S2-F	Sulfide
C	SM 20 2320B	Total Alkalinity
C	EPA 353.2	Nitrate/Nitrite
C	SW846 Method 9060A	TOC

	Analyte List- Dissolved Fraction Only	
D	SM 20 3500 FeD (Mod)	Ferrous Iron
D	EPA 350.2	Ammonia Nitrogen

Field Parameter List	
URS SOPs	pH, Eh, DO, Temperature, Conductivity

FIGURES

Legend

DuPont Property Line

Sources:
USGS Digital Line Graphs 1:100,000
USGS Land Use
Land Cover 1:250,000

Universal Transverse Mercator Projection, Zone 16, 1983 North American Datum.

1. USS Lead Refinery
2. Riley Park
3. Salvage Yard & G C Trucking
4. Standard Oil Refinery
5. East Chicago Solid Waste Transfer Station
6. Harbison-Walker Refractories
7. Shell Oil Company
8. Robinson Steel
9. Marport Smelting
10. Former Nike Missle Base

0 2640 5280
FEET

DESIGNED	INITIALS
A. BAINES	
DRAWN	
D.H. ENGLISH	
CHECKED	
A. BAINES	
APPROVED(DESIGN)	
APPROVED(CONSTRUCTION)	

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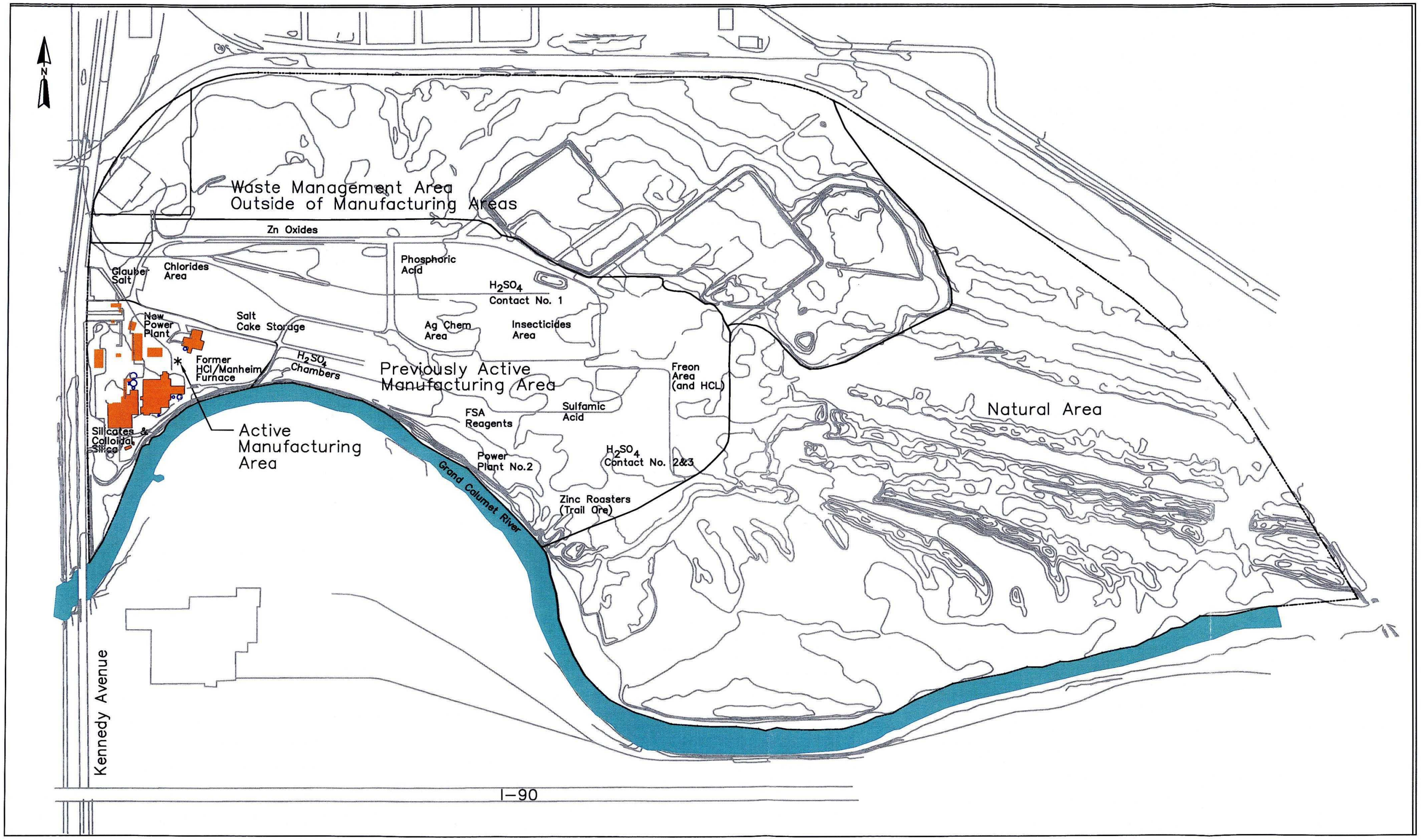
Corporate Remediation Group
An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 19
Wilmington, Delaware 19805

SITE LOCATION MAP

DuPont East Chicago Facility
East Chicago, Indiana

SCALE	DATE	CAD FILE NO.	FIGURE
1" = 1 MILE	10-30-2006	FIG. 2.1	2.1



Legend

- DuPont Property Line
- Contours – 2ft Interval
- Area Boundaries
- * Silicates and Colloidal Silica

Sources:
Plant Drawings

SCALE
600' 0 600' 1200'

DESIGNED	INITIALS
A. BAINES	
DRAWN	
D.H. ENGLISH	
CHECKED	
A. BAINES	
APPROVED(DESIGN)	
APPROVED(CONSTRUCTION)	

DUPONT

Corporate Remediation Group
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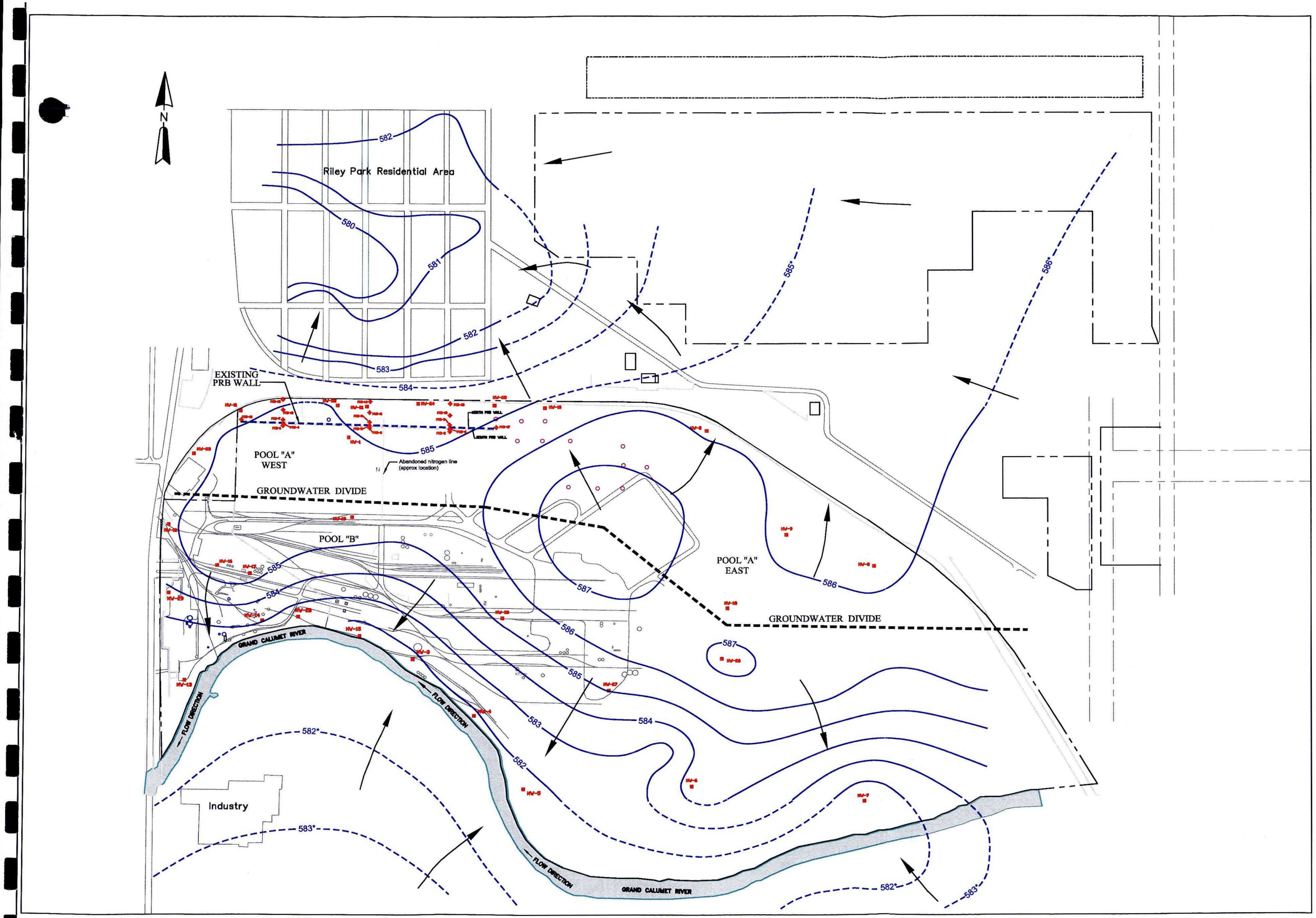
Wilmington, Delaware 19805

SITE MAP

DuPont East Chicago Facility
East Chicago, Indiana

SCALE	DATE	CAD FILE NO.	FIGURE
1" = 600'	10-30-2006	FIG. 2.2	2.2



LEGEND

—·-—	DuPont Property Line
- - - -	GROUNDWATER DIVIDE
■	MONITORING WELL LOCATION
◆	PRB WELL LOCATION
—583—	GROUNDWATER CONTOUR WITH ELEVATION
- - 583* - -	GROUNDWATER CONTOUR ELEVATIONS ARE INFERRED BASED ON SIX USGS GROUNDWATER STUDIES PERFORMED IN THE EAST CHICAGO AREA. THE USGS STUDIES PRODUCED TEN (10) GROUNDWATER FLOW FIGURES FOR THE FOLLOWING MONTHS: 03/86, 05/86, 09/86, 07/88, 08/88, 02/90, 11/90, 06/92, 09/92, AND 07/97 THROUGH 02/2001.
←	GROUNDWATER FLOW DIRECTION
←	GRAND CALUMET FLOW DIRECTION

SCALE

400' 0 400' 800'

DESIGNED	INITIALS
S. KUMAR	
DRAWN	
D.H. ENGLISH	
CHECKED	
S. KUMAR	
APPROVED(DESIGN)	
APPROVED(CONSTRUCTION)	

DUPONT

Corporate Remediation Group

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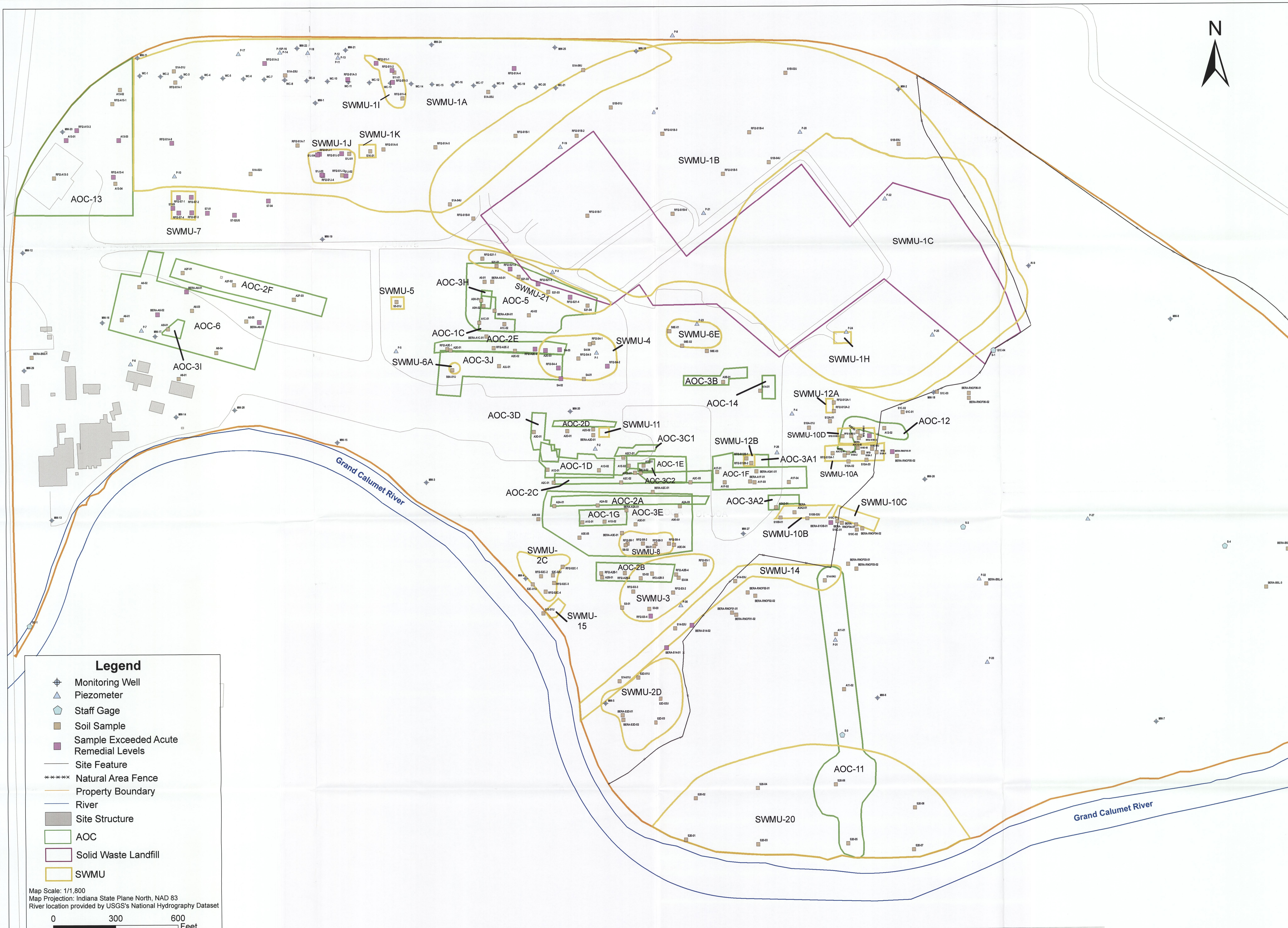
Wilmington, Delaware 19805

POTENTIOMETRIC SURFACE MAP

DuPont East Chicago Facility
East Chicago, Indiana

SCALE	DATE	CAD FILE NO.	FIGURE
1" = 400'	10-30-2006	FIG. 2.3	2.3



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Wilmington, DE 19805

Title: Locations of Areas that Exceed Remedial Levels
Supplemental Corrective Measures Investigation Workplan
DuPont East Chicago Facility
East Chicago, Indiana

Drawn: ND	Date: 08/8/07	DuPont Project No.: 507754
DQC: AAB	Figure No.: 3-1	URSD Project No.: 18984147

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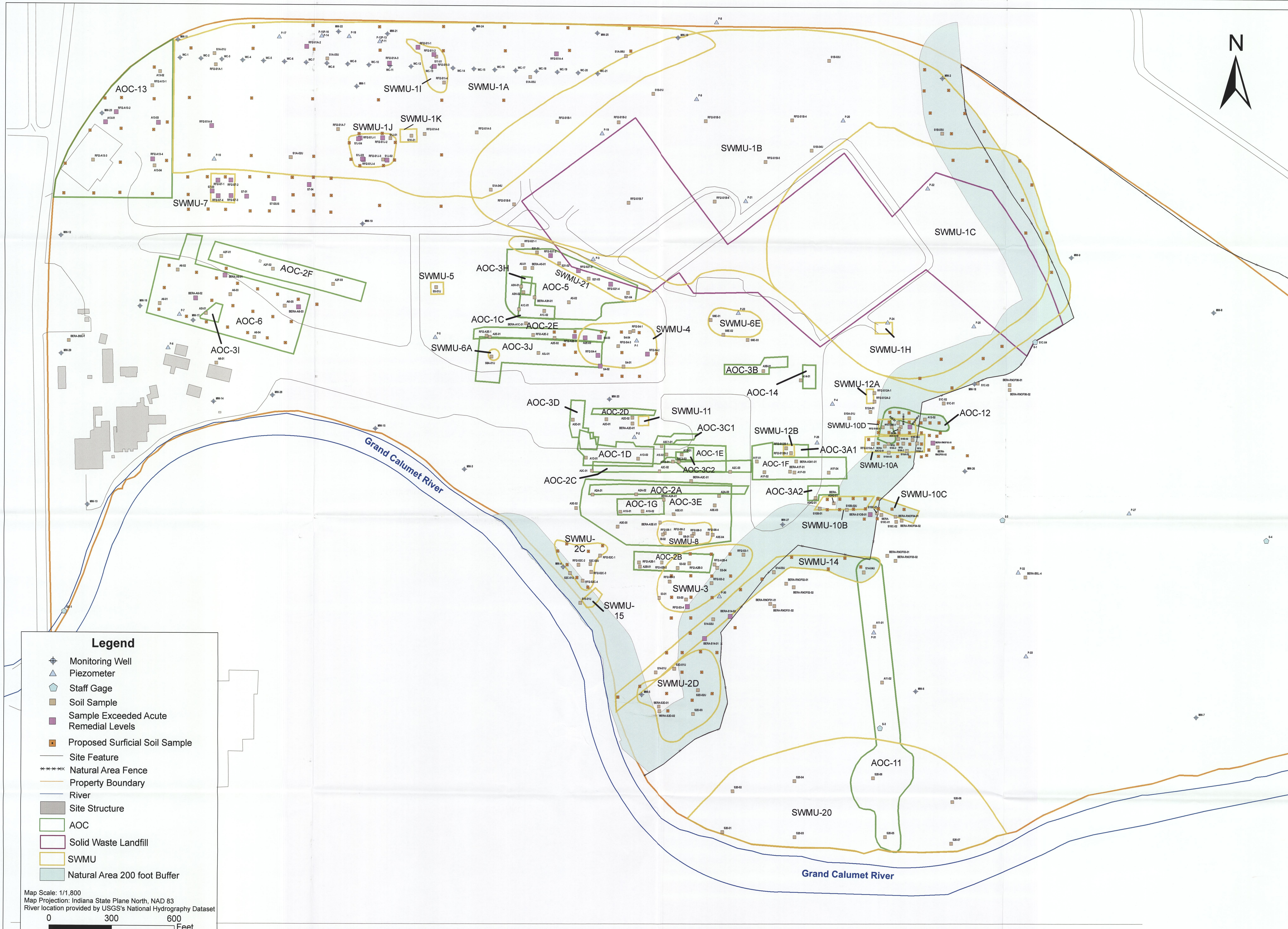

DUPONT

CORPORATE REMEDIATION GROUP

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Wilmington, DE 19805

Title: Proposed Surface Soil Sample Locations
Supplemental Corrective Measures Investigation Workplan
DuPont East Chicago Facility
East Chicago, Indiana

Drawn: ND	Date: 08/8/07	DuPont Project No.: 507754
DQC: AAB	Figure No.: 3-2	URSD Project No.: 18984147
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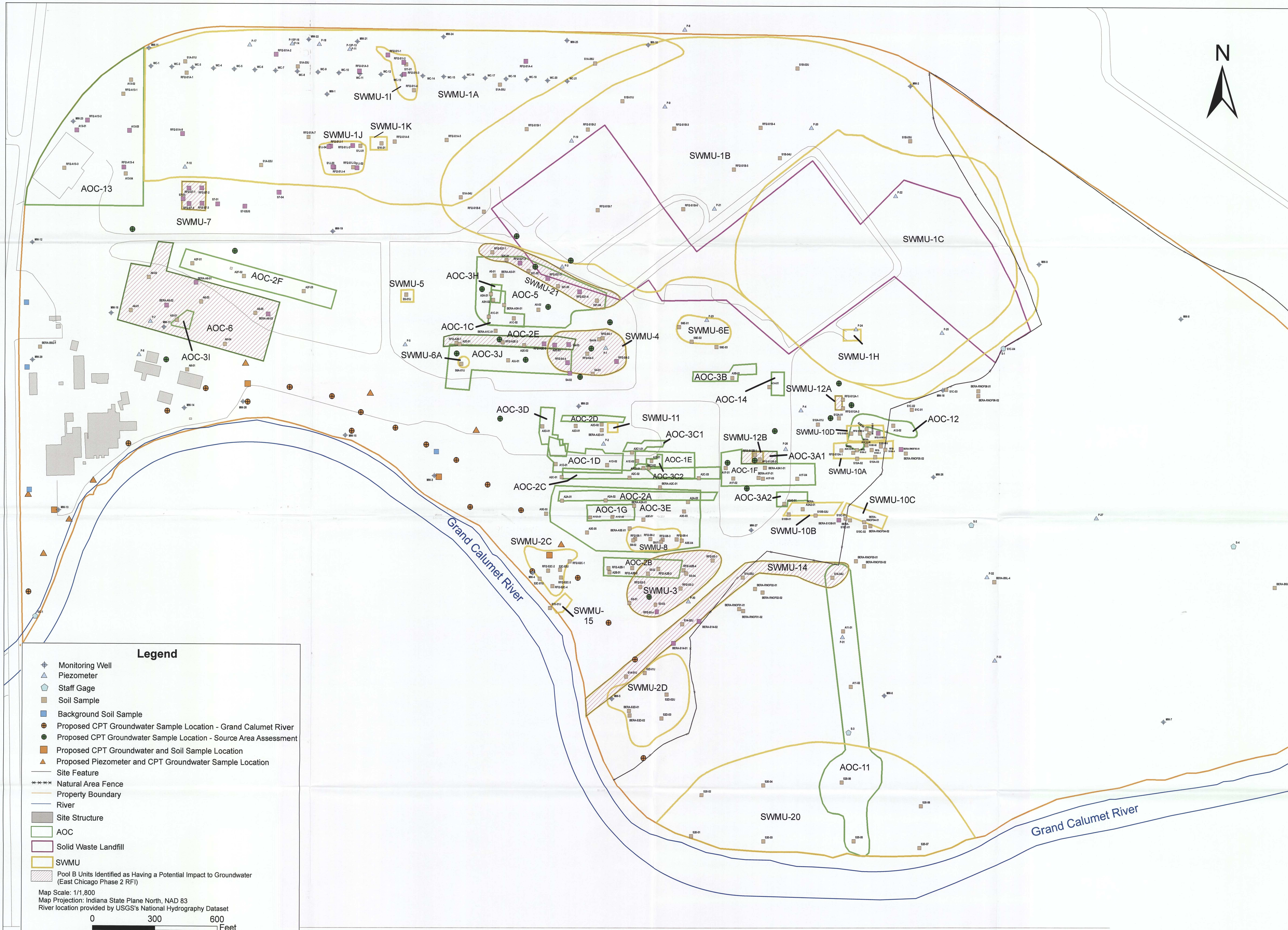

DUPONT

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Wilmington, DE 19805

Title: CPT Boring Soil, Groundwater and Piezometer Locations
Supplemental Corrective Measures Investigation Workplan
DuPont East Chicago Facility
East Chicago, Indiana

Drawn: ND	Date: 08/8/07	DuPont Project No.: 507754
DQC: AAB	Figure No.: 3-3	URSD Project No.: 18984147

File: G:\East_Chicago\GIS\Projects\Supplemental_CMI_Workplan\EC_fig_3_3.mxd

APPENDICES

APPENDIX A

GROUNDWATER SAMPLING METHODOLOGY

Appendix A
GROUNDWATER SAMPLING METHODOLOGY

The CPT groundwater sampler consists of a shielded well point sampler constructed of heavy-duty material. The shield prevents sampler contamination while penetrating soils above the sampling depth. Once the sampling depth has been reached, the sampler screen is exposed and groundwater is allowed to flow, under in-situ pressure conditions, through the sample screen into a 350-ml sample barrel. Due to in-situ pressure, once the CPT screen is exposed, groundwater will flow through the sample barrel and into the hollow CPT rods until equilibrium is attained; equilibrium is attained when the water within the CPT rods is within 10 feet of the water table.

Using the CPT groundwater sampler, groundwater samples will be collected in one of two ways.

- Method #1: Groundwater samples at each CPT location will be collected from shallow depth to deep depth. Once the CPT rig has exposed the CPT sampler screen at the shallowest depth of interest, the CPT crew will wait for groundwater within the rods to reach equilibrium. Once equilibrium has been attained, the groundwater sampler will be pulled out of the ground, sample barrel will be separated from the sampler rods, and the groundwater sample will be poured into laboratory supplied vials. The sampler and associated rods will then be cleaned prior to advancing the sampler down to the next sampling interval where the process will be repeated.
- Method #2: Groundwater samples at each CPT location will be collected from deep to shallow. Once the CPT rig has deployed the sampler at the deepest sample interval, clean small-diameter tubing equipped with either an inertial pump or peristaltic pump will be lowered down the CPT rods into the groundwater flowing through the CPT sampler into the CPT rods. The groundwater will be pumped to the surface were it will be collected in laboratory-supplied vials. With the well screen still exposed, the groundwater sampler, pump, and tubing will be raised to the next highest sample interval. Using the same small-diameter tubing and pump, three volumes of water will be calculated and purged from the CPT sampler, CPT rods, and small-diameter tubing to prevent cross contamination. Once purging has been completed, the groundwater sample will be collected. This process will continue until either all samples for the boring are collected or the sample point screen fails due to sediment accumulation. If screen failure occurs, the CPT sampler will be removed, cleaned, and re-deployed to complete the groundwater sampling activities.

For each CPT location, once the last groundwater sample has been collected, the CPT rig will grout the boring from just below the water table up to the ground surface. The grouting of this interval will prevent the creation of a direct surface-to-groundwater conduit. Below the water table, the CPT boring will be allowed to naturally backfill with native material.

APPENDIX B

SURFACE SOIL SAMPLING METHODOLOGY

Appendix B

SOIL SAMPLING METHODOLOGY

The surface soil samples will be collected at two or three intervals to a total depth of 2 feet bgs. Samples will be collected from ground surface down to a depth of 0.5 foot bgs, and from either 0.5 ft to 2.0 ft bgs or 0.5 ft to 1 ft and 1 ft to 2 ft depending on the SWMU being sampled. Deeper samples collected at CPT and background locations will be sampled from intervals presented on Table 3.1. Soil samples will be collected using either one, or a combination of the following methods:

- A clean hand auger will be advanced to a depth of 0.5 foot bgs, its contents emptied into a clean stainless steel bowl, where it will be composited and placed in a sample jar. The hand auger and bowl will then be cleaned with an Alconox/water (de-ionized or distilled) mixture, and rinsed with de-ionized/distilled water before being returned to sampling use. The hand auger will then be advanced the next interval- either 0.5 to 1 ft or 0.5 to 2.0 ft bgs, emptied into a clean stainless steel bowl, composited and placed in a sample jar. As applicable, this process will be repeated to sample the 1 to 2 ft interval. As needed, a clean breaker bar may be used to penetrate through material that is difficult to excavate. The hand auger and bowl will be decontaminated following the procedures outlined above before sampling the next location.
- A clean 2 foot split spoon driven by either a Geoprobe, drill rig, or CPT rig to a depth of 2.0 feet bgs. The first 0.5 feet will be collected from the split spoon with an inert tool and placed in the appropriate sampling container. After cleaning or replacing the sampling tool, the 0.5 to 1 ft and 1 to 2 ft or 0.5 ft to 2.0 ft interval will be sampled with an inert tool and placed in the appropriate sampling container(s). The split spoon and sampling tool will be decontaminated following the procedures outlined above before sampling the next location.

The soil samples will be analyzed for the constituents identified in Section 3.0 of this document.